

REMARKS

Amendments to the Claims

Claim 1 has been amended to recite the curable elastomeric nanocomposite *consists of* the functionalized elastomer and the swellable clay.

Claim 22 has been amended to recite the method of forming an elastomeric nanocomposite is initiated by forming a curable elastomeric nanocomposite wherein only the recited elements (a) to (d) are contacted to form the curable elastomeric nanocomposite.

Claims 42 and 45 have been amended to reflect that the additions of fillers and a secondary rubber are additional steps after the curable elastomeric nanocomposite has been formed.

35 U.S.C. §112, second paragraph

Numerous claims were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the claims have been rejected as having improper Markush groups due to the use of the connecting word “and” for nested Markush groups.

The claims have been amended.

35 U.S.C. § 103

All pending claims stand rejected under 35 U.S.C. § 103 as being obvious over Arjunan (US 5700871) in view of Elspass (US 5807629) for the reasons set forth in the prior Office Actions and the Advisory Action.

Arjunan discloses a functionalized isoolefin-alkylstyrene copolymer for blending with dissimilar elastomers (col 3, lines 23-40; col 4, line 40 – col 5, line 21); thereby achieving a multi-rubber blend with desired characteristics. After the preferred isobutylene/paramethyl styrene copolymer is grafted, it is blended with the dissimilar elastomer and the blend is then compounded to include the conventional elastomeric/rubber additives such as fillers, plasticizers, and cure packages (col 7 – col 8, line 24).

Arjunan fails to teach adding a swellable clay, and it has been held obvious for purposes of improved mechanical and impermeability characteristics to look to the teachings of Elspass in regards to adding a layered clay to the material of Arjunan to create a

nanocomposite, especially as Arjunan already teaches the use of conventional fillers in the final elastomeric blend.

Even were it obvious to one skilled in the art to look to the teachings of Elspass in regards to a layered clay for addition to Arjunan – which Applicants do not concede for all the reasons previously argued by Applicant – such a combination fails to render the present claims obvious.

Claim 1 recites the curable elastomeric nanocomposite *consists of* the swellable clay and the functionalized styrenic derived elastomer. Arjunan requires the essential element of a dissimilar elastomer – any conventional fillers taught by Arjunan are not even incorporated into the blend until after the grafted isoolefin/alkylstyrene copolymer and the dissimilar elastomer are formed. Per the arguments presented by the Office, it would have been obvious to add the clay of Elspass to the blend of Arjunan in place, or in addition, to the conventional fillers used in the final blend. However, such an incorporation of filler occurs after the blend of the two elastomers of Arjunan and thus the modified blend of Arjunan contains elements excluded by claim 1. Elspass fails to cure the deficiency of Arjunan in this respect and fails to teach or suggest to those in the art the active removal or elimination of the essential dissimilar elastomer of Arjunan. Thus, Arjunan as modified by Elspass fails to teach or render obvious the recited curable elastomeric nanocomposite of claim 1 and the claims dependant upon claim 1.

Claim 22 recites a process for forming an elastomeric composite wherein first a curable elastomeric nanocomposite is formed by contacting the essential elements of the styrenic elastomer, functionalized compound, and clay. Thus, when the clay is added to the curable elastomeric nanocomposite, no other elastomers are present in the contacting phase. Arjunan as modified with Elspass fails to teach such a process. As noted above, Arjunan teaches first blending the grafted isoolefin/alkylstyrene copolymer with the dissimilar elastomer prior to any addition of filler – so the two elastomers are compatibilized (see col 2, lines 59-65). Thus, Arjunan as modified by Elspass fails to teach or render obvious the recited process of claim 22 and the claims dependent thereon.

Claim 72 recites a curable elastomeric nanocomposite *consisting essentially of* a swellable clay and an isobutylene based elastomer having specific functional groups on styrenic monomer units pendant to the elastomer. As noted above, the dissimilar elastomer of Arjunan is an essential element of the disclosed compatibilized elastomer blend; Elspass fails

to teach eliminating such an essential element of Arjunan. Thus, the elastomeric of Arjunan as modified by Elspass fails to teach or render the recited curable elastomeric nanocomposite of claim 73 and its dependent claims obvious.

The Office may take the position that since Elspass teaches usefulness of the elastomer ('the polymer matrix' per Elspass) and the clay prior to the additional of any 'solid rubber' per col 3, lines 33-47, it would have been obvious to one skilled in the art a) that the dissimilar rubber of Arjunan is not essential or b) the clay may be incorporated prior to the blending of the two elastomers of Arjunan. Applicants would disagree. For a): if the dissimilar rubber of Arjunan is not essential to the blend of Arjunan, there is no reason to graft a compatibilizing agent to the disclosed isoolefin/alkylstyrene elastomer. For b): as noted above, the goal of grafting the polymer of Arjunan is for finer dispersion of the elastomers, reduce interfacial energy between the elastomers, and improve interfacial adhesion; the presence of a clay already incorporated into the grafted isoolefin/styrene elastomer will be hindrance to achieving these desired goals of Arjunan.

Conversely, it might be argued that the polymer matrix in the composite material of Elspass may be provided with a functional group as taught by Arjunan – but to what purpose and goal? Arjunan teaches that the compatibilizing agent is only necessary for blending the isoolefin/alkylstyrene elastomer and the dissimilar rubber - remove the dissimilar rubber and there is no need for the functional group as taught by Arjunan. Even if it were argued that one would functionalize the matrix of the composite material of Elspass for the goal taught by Arjuna since Elspass teaches the addition of a secondary solid elastomer, such a blend would then be outside the scope of the claims which exclude the presence of an essential element of Elspass. Modifying Elspass for the purpose of improving compatibility in elastomer blends without then adding the secondary elastomer would be a rejection made solely in hindsight of the present invention.

In light of this amendment, Applicants are of the position that all of the claims now pending in the subject patent application are allowable. Thus, the Examiner is respectfully requested to allow all pending claims. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated, since this should expedite the prosecution of the application for all concerned.

Please charge any deficiency in fees or credit any overpayments during the entire pendency of this case to Deposit Account No. 05-1712 (Docket No. 2002B093/2). Please also charge any petition fees, including fees for extensions of time necessary for the pendency of this case or copendency of this application with another application at any time to Deposit Account No. 05-1712 (Docket No. 2002B093/2).

Respectfully submitted,

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Date

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